REVIEWS

Intermountain Flora. Vascular Plants of the Intermountain West, U.S.A. Volume 5. Asterales. By ARTHUR CRONQUIST. 1994. The New York Botanical Garden, Bronx, New York. 496 pp. $75.00. ISBN 0-89327-375-9.

The publication of volume 5 represents another milestone in the Intermountain Flora project. This regional flora project was initiated in the 1940's and volume 1 was published in 1972. Since then additional volumes have appeared at irregular intervals and in an irregular sequence. To date, five volumes have been published: 1—*Geological and Botanical History, Plant Geography, Vascular Cryptogams, Gymnosperms, and Glossary* (1972); 6—*The Monocotyledons* (1977); 4—*The Asteridae Except the Asterales* (1984); 3, part B—*Fabales* (1989); and 5—*Asterales* (1994).

Volume 5 is the last major work of the late Arthur Cronquist, and represents well his impact on the floristics of North America. During his long and productive career, Art was a major contributor to regional floras of the Pacific Northwest, the northeastern U.S. and adjacent Canada, the southeastern U.S., and the Intermountain Region, and his influence extended to the floras of many other regions as well. At the time of his death, Art had read first proof on the text of volume 5, but less than half of the illustrations had been completed. Noel and Pat Holmgren, with the assistance of various collaborators, brought the book to completion.

As defined by Cronquist the Asterales consists of only one family, the Asteraceae. Art Cronquist's association with this family dates to early in his career, and *Erigeron,* the subject of his dissertation research, is the largest genus (72 species) of the Asteraceae in the Intermountain Region. Art had extensive field experience with the Asteraceae of the region and this is reflected throughout the volume in his comments on range, habitats, and patterns of variation.

Visually, the presentation of the Asteraceae is outstanding. The description of the family is clear and is followed by a brief discussion of the specialized terminology associated with the family. This discussion would have been enhanced by a plate in which the features were illustrated and contrasted. The book has an artificial key to genera, a synoptical key to tribes, and tribe by tribe keys to genera. For the Heliantheae there is a key to subtribes, and the genera are keyed within the subtribes. Descriptions and keys for species and infraspecific taxa are clearly written, but the descriptions often are not parallel in composition and information content. Some are of the "much like such and such but differing by thus and so" format. I much prefer descriptions that are fully parallel and comparable and that are written as a series of statements rather than one long sentence with a lot of semicolons. Full synonymy is presented with type citations. Common names are given for many taxa, though I noted that some widely used common names are omitted (e.g., sweet bush for *Bebbia juncea* and desert-chicory for *Rafinesquia neomexicana*). Each species is illustrated with one or more excellent line drawings. Habitat and range statements include both Intermountain and extralimital distributions. Descriptions are supplemented in various places with additional commentary.

Two new species and one new variety are published within the volume, and 32 new combinations are made. These are listed at the end of the taxonomic treatments. A short addendum by Noel H. Holmgren details several taxa that were described or documented from the Intermountain Region following Cronquist's death. The editors compiled name changes that appeared in the literature too late for Cronquist to have seen them and inserted them into the synonymy lists, but no changes were made in Cronquist's taxonomic treatments. The index includes both the recognized species and the synonyms.

I tried out the keys and found that in most cases they work well. In Group II of the artificial key, however, *Pectis papposa* keys to *Arnica*. Variable taxa often key in more than one place and exceptions are not shoehorned into places where they do not fit. The useful convention in which the key statement leading to a smaller number of taxa or subsequent couplets precedes the statement leading to a larger number is followed for the most part. The couplets are numbered, but the second of a pair of key statements is not distinguished by a prime. A parenthetical caveat beneath the title of the synoptical key to tribes warns that the artificial key should be used for identification. If one knows the tribe or can determine it from the key to tribes, an alternative to the artificial key is available.

The organization of the genera follows Cronquist's concept of tribal relationships. A few generic placements are questionable. Although acknowledging that *Rigiopappus* may be out of place in the Heliantheae subtribe Madiinae where it traditionally has been placed, Cronquist retained it there rather than including it in the Astereae. He also maintained the traditional association of *Raillardella* with *Arnica* rather than including the former in the Madiinae where recent evidence suggests it is better placed, but he did break from tradition in placing *Arnica* into the Heliantheae (as part of subtribe Arniceae) instead of the Senecioneae.

As treated by Cronquist and supplemented by Holmgren the Asteraceae of the Intermountain Region comprise 133 genera (not including some escapes from cultivation briefly noted in the addendum) and 616 species. By way of comparison the Asteraceae of California comprise 178 genera and 748 species (Hickman 1993). The comparison at the generic level is somewhat misleading, however, because of differing generic circumscriptions by Cronquist and some of the contributors to the *Jepson Manual*. If Cronquist had followed the generic concepts of the *Jepson Manual* authors, the genera of the Intermountain region would total 146.

Cronquist's generic concepts can best be represented by one word—TRADITION! Over and over Cronquist invoked his preference for traditional generic concepts in rejecting the contrasting views (and supporting evidence) of recent workers. As a result the Intermountain Region is still populated by numerous mismatched species of the dustbin genus *Haplopappus*. "*Haplopappus* is here taken in the broad sense that has been traditional (but disputed) since the monograph by H. M. Hall in 1928." *Eupatorium* too is maintained as a giant, polymorphic genus. "As traditionally (and here) defined, *Eupatorium* consists of nearly 1000 species . . ." It is not that Cronquist consistently preferred large, broadly inclusive genera. "*Kuhnia* has traditionally been held as a distinct genus, differing from the related genus *Brickellia* most notably by its plumose rather than merely barbellate pappus. . . . *Kuhnia* is a natural, readily recognizable group, nested in but easily distinguishable from *Brickellia*. In such cases I prefer to follow historical precedent." *Chrysopsis* (sensu lato including sect. *Phyllotheca*) and *Heterotheca* are kept separate despite the acknowledged facts that the pappus character that separates them occasionally fails and that some of their species are able to hybridize. After evaluating alternative treatments of these plants, Cronquist concluded ". . . I prefer to follow tradition." In total I noted seven instances in which Cronquist invoked tradition as his justification for making a taxonomic decision on generic limits.

In taking his stand on tradition, Art Cronquist rejected the work of many specialists who have used a variety of approaches to unraveling generic and species relationships. Among the taxonomists whose work was disregarded are Charles Heiser and Willard Yates (*Heliomeris*), Harold Robinson and R. D. Brettell (*Rigiopappus*), Mark Bierner (*Dugaldia*), Gregory Brown (*Platyschkuhria*), Lowell Urbatsch (*Ericameria*), Ronald Hartman and Billie Turner (*Machaeranthera*), Thomas Watson (*Xylorhiza*), John Semple (*Heterotheca*), G. Ledyard Stebbins and Randall Bayer (*Antennaria*), Robert king and Harold Robinson (*Ageratina, Pleurocoronis*), and Spencer Tomb (*Lygodesmia, Prenanthella*).

Cronquist generally gave a brief discussion of the alternatives before taking his stand on tradition. Readers who wish to use alternative taxonomies can glean the

appropriate names from the synonymy lists. In one instance at the species level, however, I noted the absence of such commentary. Cronquist accepted *Baccharis glutinosa* Pers. and *B. viminea* DC. as distinct species and made no mention either of the study by Wilken (1972) that indicated that these names apply to seasonally dimorphic growth forms of the same species or the study by Cuatrecasas (1968) that indicates that *B. salicifolia* (Ruiz & Pavón) Pers. is the correct name for *B. glutinosa,* and hence for the species.

In a minority of cases Cronquist opted for a less traditional taxonomy. He followed Strother (1986) in part in dividing *Dyssodia* (sensu lato) into smaller genera. He accepted *Sphaeromeria* as distinct from *Tanacetum* and *Euthamia* as distinct from *Solidago.* Other examples are recognition of *Chloracantha* as a genus distinct from *Aster* and the inclusion of *Leucelene* within *Chaetopappa.*

In a way this is a review of more than just the Asteraceae of the Intermountain Region. Over his long career, Art Cronquist put his stamp on Asteraceae systematics over large parts of North America. In recent years Art established his concepts of traditional Asteraceae genera for the southeastern United States (Cronquist 1980), the northeastern U.S. and adjacent Canada (Gleason and Cronquist 1992), and now the Intermountain Region. In my opinion, a flora should reflect the state of taxonomic knowledge that existed at the time it was compiled. It is destined to become the standard reference for a region and its nomenclature infiltrates herbaria, classrooms, theses, journal articles, local floras, etc. Because the time between new regional floras is usually generational or longer, there is commonly a long time lag after a flora has been published before new advances in systematic knowledge become generally known. At the same time it is unavoidable that the taxonomic philosophy of the author or authors will be reflected in the pages of a flora. Cronquist's treatments of the Asteraceae of the Intermountain Region and other regions certainly are reflective of his conservative taxonomic philosophy. However, I do not believe that they reflect the current state of Asteraceae systematics. Too many recent advances have been rejected in deference to tradition. Preparation of generic treatments for the Asteraceae of North America will soon be undertaken as a part of the *Flora of North America* project. I hope that the taxonomic decisions that are made for FNA are based on the best data available and not on tradition.

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